circle rather than within the sun-dance lodge. Of this form the commonest method was for the dancer to drag one or more dried buffalo skulls attached to skewers inserted in his back, just as the skewers were inserted in the breast in the previous form of torture (Fig. 2).

Mr. H. R. Voth continues his valuable investigations on the Hopi Indians with a particularly interesting account of the customs and ceremonies connected with birth in Oraibi, the largest of the seven Hopi villages, and a suggestive paper on Hopi proper names. When a child is twenty days old it receives its first names from the grandmother, or other close relative on its mother's side, and from other women, all of whom must belong to the clan of the mother and child. The "child-name" is retained until the child is initiated into some order or society, when a new name is given, and at every subsequent initiation a fresh name is given. All Hopi proper names have some reference to the clan totem of the name giver, never, unless coincidentally, to the clan totem of the bearer of the name. The same investigator publishes 110 traditions of the Hopi, which were collected in the vernacular and without an interpreter.

A. C. H.

NOTES.

SIR WILLIAM THISELTON-DYER, K.C.M.G., F.R.S., has been elected a member of the American Philosophical Society.

BARON DE GUERNE has been elected president for 1906 of the Paris Geographical Society, M. E. H. Martel chief vice-president, and Baron Hulot general secretary.

THE editors of the *Geological Magazine* have issued invitations to a reception to be held on the evening of February 8, to commemorate the publication of the five hundredth number of that periodical.

PROF. KARL VON FRITSCH, president of the Leopold-Caroline Academy, and professor of geology and palæontology in the University of Halle, died on January 9 in his sixty-seventh year. Of his written works, the most widely known is his "Allgemeine Geologie."

FROM Basel we learn that Swiss engineers have sketched out a plan for connecting Switzerland with the North Sea and the Mediterranean by means of an immense canal system at an estimated cost of 324,000,000 francs. On the one side Rotterdam is to be reached from Lake Constance by means of the Rhine, and on the other side Lake Como is to be brought into connection with the Mediterranean by means of the River Po.

THE sum of nearly 2000*l.* has been given by Judge Holek (Denmark) for the purpose of effecting Porsild's plan of a biological station in Greenland, and the Danish Government has agreed to be responsible for a large part of the annual upkeep of the station, which is estimated to run to 11,000 kroner (111*l.*). The most eminent travellers in polar regions in general, and in Greenland in particular, have testified to the value of such a station.

ON Thursday next, February 1, Mr. Benjamin Kidd will begin a course of two lectures at the Royal Institution on "The Significance of the Future in the Theory of Evolution," and on Saturday, February 3, Mr. J. W. Gordon will deliver the first of two lectures on "Advances in Microscopy." The Friday evening discourse on February 2 will be delivered by Prof. S. P. Thompson on "The Electric Production of Nitrates from the Atmosphere," and on February 9 by Mr. H. F. Newall on "Eclipse Problems and Observations."

A NOTE special to Monday's *Pall Mall Gazette* announces that "a new system of wireless electrical communication that seems admirably suited for connection over distances of a few miles, and that possesses the advantage of cheapness, reliability, and secrecy in a degree that probably exceeds all the other systems, has just emerged from some very successful trials in Germany." The experiments described were made near Berlin by Mr. E. Ruhmer, but the "special" news referring to them adds nothing to the account of his system given in NATURE two years ago (February 18, 1904, vol. lxix., p. 373) in an article on "Photo-telephony."

MR. ELNAR MIKKELSEN, the young Danish explorer who, in conjunction with Mr. Leffingwell, an American, is organising an expedition to the Beaufort Sea, has just left this country for the United States. It is proposed that Mr. Leffingwell and other members of the expedition shall travel down the Mackenzie River in the early summer of this year, while Mr. Mikkelsen, should he be able to obtain a suitable vessel, will leave San Francisco in April, and after spending some time on the Siberian coast purchasing necessary equipment, meet the rest of the party at the mouth of the Mackenzie some time in the latter part of August. Thence the expedition will make its way to Cape Kellet, in Banks Land, and begin the exploration of its special region. The work to be undertaken depends to some considerable extent on the arrangements which it may be possible to make with regard to the fitting out of a ship.

AT a meeting at the Royal United Service Institution on January 18, Major Goodwin, D.S.O., delivered a lecture on "Military Hygiene on Active Service." After briefly describing the origin and causation of those diseases which affect armies in the field, and discussing and comparing the statistics of the Boer and Russo-Japanese wars, the lecturer suggested that there are two principal measures, which, if organised and perfected, will entirely remedy, in his opinion, the great evil which has existed in the past. The first measure is sanitary organisation—a corps should be formed of officers and men specially trained in all the methods of sanitation—the second is the necessity for the further education of regimental officers and men in sanitary principles.

THE annual general meeting of the Entomological Society of London was held on January 17. Mr. F. Merrifield, the president, read an address on the general operation of temperature on the growing organism of lepidopterous insects, based on a series of experiments, especially with reference to the remarkable limitations imposed by climatic and artificial conditions. The report of the society showed that for the first time in its history the number of ordinary fellows had reached five hundred. The officers and council were elected for the session 1906–7 as follows:—President, Mr. F. Merrifield; hon. treasurer, Mr. A. H. Jones; hon. secretaries, Mr. H. Rowland-Brown and Commander J. J. Walker, R.N.; librarian, Mr. G. C. Champion; other members of the council, Mr. G. J. Arrow, Mr. A. J. Chitty, Mr. J. E. Collin, Dr. F. A. Dixey, Mr. H. Goss, Mr. W. J. Kaye, Mr. H. J. Lucas, Prof. E. B. Poulton, F.R.S., Mr. L. B. Prout, Mr. E. Saunders, F.R.S., Mr. R. S. Standen, and Mr. C. O. Waterhouse.

DR. H. J. P. SPRENGEL, F.R.S., the inventor of the mercury air-pump, whose death we announced last week, was for three years an assistant in the chemical laboratory

of Oxford University; afterwards he worked in the laboratories of Guy's and St. Bartholomew's Hospitals, London. He was elected a Fellow of the Royal Society in 1878. His air-pump, which he described to the Chemical Society in 1865, led to results which had an important influence on the development of both science and industry in the latter part of last century. It provided a convenient method of obtaining vacua of very high tenuity, and contributed greatly to the perfection of the incandescent electric lamp. Dr. Sprengel devoted much time to the study of detonation and explosives, and in 1871 took out patents for a class of explosive substances which were non-explosive during their manufacture, storage, and transport. He was the first to direct attention to the value of picric acid as an explosive when fired by a detonator. In addition to papers on his vacuum pump and kindred subjects, Dr. Sprengel published the following contributions to science among others:—Atomised water as a substitute for steam in a chemical process, 1873; improvements in explosive compounds, 1871; on a new class of explosives, 1873; the Hell-Gate explosion near New York and so-called "Rackarock," 1886; the discovery of picric acid as a powerful explosive and of cumulative detonation with its bearing on wet gun-cotton, 1902.

THE fifty-fifth meeting of the American Association for the Advancement of Science was held at New Orleans, and began on December 29 last. The membership of the association has now reached 4500. It has been decided to hold two meetings during 1906, one in the summer at Ithaca, N.Y., the other in the winter at New York City. At the recent meeting, the address of the retiring president, Prof. W. G. Farlow, dealt with the popular conception of a scientific man at the present day. The presidents of the different sections delivered their addresses on various days throughout the meeting. Prof. Ziwet, at the first meeting of the section of mathematics and physics, took for his subject the relation of mechanics to physics. Prof. Kinnicutt, in the section of chemistry, considered the sanitary value of a water analysis. Prof. Merriam, in the section of zoology, discussed the question, Is mutation a factor in the evolution of the higher vertebrates? The subject of the partition of energy was taken up by the president of the physics section, Prof. Magie; and the generic concept in the classification of the flowering plants was dealt with by Prof. Robinson in the section of botany. Prof. Knapp, in the section of social and economic science, considered the subject of transportation and combination. In the section of mechanical science and engineering, Prof. Jacobus addressed the meeting on commercial investigations and tests in connection with college work. The experience at New Orleans makes it doubtful whether the experiment of scattering the addresses of the presidents of sections through a week is a wise departure.

WE have received copies of the reports of the Bristol Museum and Reference Library for 1904, and of the Bristol Museum and Art Gallery for 1905. The change in the title of the institution is due to the opening of the Art Gallery, which took place in February of last year, when the inaugural address was delivered by the late Prof. Herkomer. About the same time Mr. F. G. Pearcey entered the museum as assistant curator, and since his appointment a thorough re-arrangement of the zoological exhibits has been undertaken, while large additions have been made by gifts and purchase.

BOTANICAL surveys undertaken with the object of studying the distribution of plants over a limited area have been prepared by several workers in Scotland and England. Mr. G. H. Pethyridge and Mr. R. L. Praeger publish in the *Proceedings of the Royal Irish Academy* (vol. xxv.) a survey of the vegetation of the district lying south of Dublin. The authors distinguish four zones, littoral, agrarian, hill pasture, and moorland. It was observed that the three associations of *Ulex Europaeus, Ulex Gallii,* and Calluna maintain a definite succession in altitude, *Ulex Europaeus* occurring at the upper limit of the agrarian zone, and Calluna forming the most important feature of the moorland. The association in which Pteris is the dominant member occupies positions in each of the three former associations, holding its own where it is favoured by well-drained soil and a sheltered situation. The paper is accompanied by six illustrations, of which the one reproduced shows the characteristic rounded hummocks of *Ulex Gallii* in the foreground; in the background the farmland is seen below with *Ulex Europaeus* just visible in the middle distance and Calluna clothing the summit of the hill.

Photo. *R. Welch.*

FIG. 1.—Piperstown Hill, showing, in ascending order, farm land, *Ulex Gallii* association, and Calluna association.

THE educational advantages of the Central Museum at Brooklyn, New York, form the subject of the first article in the January issue of *Museum News*, in which attention is specially directed to the exhibits of typical groups of mammals, birds, and reptiles. It would seem, however, that the museum authorities themselves stand in need of education, otherwise they would scarcely have stated "that the present revolution in Russia bids fair to complete the extermination of the European bison by killing off the Lithuanian herd." They appear to be quite unaware of the existence of this animal in a truly wild state in the Caucasus.

IN addition to several papers relating to the human subject, the January issue (vol. xl., part ii.) of the *Journal of Anatomy and Physiology* contains contributions on the anatomy and development of the lower mammals. Among these is one by Dr. T. H. Bryce on the development of the thymus gland in the lung-fish, *Lepidosiren paradoxa*, in the course of which the author arrives at the important conclusion that, at least up to an advanced larval condition, this organ has absolutely nothing to do with the development of leucocytes. Apparently the leucocytes take origin in a tract along the hind kidney, and, at any rate, there is evidence of their existence before the thymus cells have lost their epithelial characters. In another paper Prof. Symington discusses the bearing of the structure of fœtal whale-flippers on the development of additional digits and joints in the hand and foot of vertebrates generally. In cetaceans the suppression of nails or claws has led to the development of a cartilaginous rod at the end of each digit which is apparently a reversion to the primitive mammalian condition. "Such a condition would obviously facilitate the development of additional cartilaginous elements to adapt the limb to its newly acquired function as a balancing and steering organ." Hence the occurrence of "hyperphalangism" is easily accounted for, while indications of incipient "hyperdactylism" are afforded by rudiments in some cases of the development of a sixth digit.

IN the annual report of the Botanical Department, Trinidad, for the year 1904–5, the superintendent, Mr. J. H. Hart, directs attention to the advantages of budded over seedling oranges in maintaining the qualities of any selected strain. Trinidad oranges have been successfully transported to England from time to time, and last year a consignment of mangos was sent over that carried well, and was said to compare favourably with the best Indian fruit. Among shade trees for cacao, *Gliricidia maculata*, the "Madura" of Central America, has been in considerable demand, and Honduras mahogany has also been planted. The cotton experiment plots suffered severely from the "boll rot."

MR. D. MCALPINE records in *Annales Mycologici* (vol. iii., No. 4, 1905) the discovery of a peculiar set of rusts on species of Acacia in Australia that he places in a new genus, Uromycladium. The characteristic of the genus is a branched carpophore producing at the ends of each branchlet one to three separate teleutospores, or in place of one of the teleutospores a colourless vesicle or cyst. Mr. McAlpine regards the genus as a link between Uromyces, which has a single teleutospore, and Ravenelia, a peculiar genus in which the stalk is compound and a number of spores are joined together at the top, with vesicles below. Of the seven species enumerated, uredospores and spermogonia are known for some, but no æcidia have as yet been found.

THE *Times* of January 12 contains a comprehensive summary of the rainfall of 1905, by Dr. H. R. Mill. The work is valuable from a double point of view—from the vast amount of material relating to the rainfall of the British Islands that Dr. Mill has at his disposal, and from the almost incredible shortness of time in which he has been able to compile his statement, in advance of the usual annual rainfall volume, which takes at least six months to produce. The author points out that during an average year no spot with a fall of less than 20 inches appears on the rainfall map of Great Britain; last year there were about 7500 square miles, while the area with rainfall exceeding 40 inches measured some 29,000 square miles, or less than a quarter of the country. In an average year more than a third of the area of the country has a greater fall than 40 inches. A table based on a thirty years' average which accompanies the paper shows that none of the fifty-one stations quoted for England and Wales reached the normal amount, that only one did so in Ireland, and about half the stations in Scotland. From these figures Dr. Mill estimates that the general rainfall for England and Wales was only 83 per cent. of the average; for Ireland, 89 per cent.; for Scotland, 96 per cent. In other words, for every inhabitant of the British Isles there was last year 224,000 gallons less rain than in an average year. Further, that the year 1905 has justified the three years' cycle of one wet year followed by two dry years; the probability of 1906 proving a wet year has not been contradicted by the weather of the first half of January.

MR. VAN DER GRINTEN, whose projection of the whole globe in a circular map, published last year, attracted considerable attention, deals with another case—that of the "apple-slice" shape—in *Petermann's Mitteilungen* (p. 237; 1905).

DR. GERHARD SCHOTT contributes a paper on the relief of the bed of the Southern Ocean, and the distribution of bottom temperatures, to *Petermann's Mitteilungen* (No. 11, 1905). The soundings and temperature observations of recent expeditions are made use of, and the author has compiled an admirable bathymetrical chart showing the state of our knowledge of the region in 1905.

THE *Zeitschrift der Gesellschaft für Erdkunde* (No. 9, 1905) contains a paper on the geographical conditions determining the distribution of moorlands, by Dr. F. Solger. The chief factors taken into consideration are rainfall, surface topography, and elevation, and the relations of these three factors in different types of moorlands are discussed.

THE publishers of *l'Elletricista* have issued a useful little book, by Dr. G. Agamennone, under the title of "La Registrazione dei Terremoti." The words "in Italia" should have been added to the title, as the book is confessedly devoted to Italian work, and hardly refers to that which has been done elsewhere, especially in Japan, where the ideas embodied in the Italian instruments were, with few exceptions, anticipated in the publications of the Seismological Society of Japan. The omission is justified by the plea of the author that any attempt at adequate recognition of the work done in other countries would have swollen the book to an undesirable size; as it is, we have a well got up and clearly written account of the seismoscopes and seismographs used in Italy, which are singularly efficient if somewhat more cumbrous than the English or Japanese patterns.

THE *Rendiconto* of the Bologna Academy (vols. v.–vi.), covering the period 1900–2, has just been sent out. It contains a series of illustrated papers by Dr. Francesco Crevatin on the terminations of nervous systems; also papers by Prof. Augusto Righi on the magnetic field of a moving charge and on the acoustic properties of condensers, by the late Prof. Emilio Villari on the heating effects of electric discharges and on Röntgenised air, by Prof. Ferdinando Paolo Ruffini on the three cusped hypocycloid, and others.

WE have received the annual report of the Circolo Matematico di Palermo, which shows an increase in its membership roll from 27 in March, 1884, and 195 in

March, 1904, to 255 in March, 1905. Of these 36 are resident, 138 non-resident, and 81 foreign members. The society owes its present position as a mathematical society of international rank largely to the personal exertions of Prof. Guccia, and further evidence of this activity is shown by the offer of a "Guccia medal" and prize of 3000 francs, to be awarded at the mathematical congress at Rome in 1908, for the best essay marking an advance in the theory of algebraic twisted curves.

MR. HENRY FROWDE has published an edition of Wordsworth's "Guide to the Lakes," with an introduction, appendices, and notes by Mr. Ernest de Sélincourt. Though Wordsworth is, throughout the book, rather the lover than the student of nature, yet the volume contains much that will appeal in a special manner to men of science—for example, the remarks on stone circles—and everything the volume contains will serve to increase the enthusiasm with which scientific students approach natural phenomena.

THE 1906 issue of their "Nature Calendar" has been published by Messrs. George Philip and Son, Ltd. It is a little difficult to understand the plan on which the notes for the months have been arranged, and on what principle the entries for successive days have been selected. Under the date January 25, for instance, are to be found the following statements:—"Jackdaws begin to come to churches"; "First appearance of Yellow Wagtail"; and "Honeysuckle leafing." A young, uninitiated nature student, who observed a jackdaw going to church, or came across a yellow wagtail, or found honeysuckle in leaf before January 25, might have his faith in naturalists' calendars seriously shaken.

A SECOND edition of Prof. Douglas H. Campbell's work on "The Structure and Development of Mosses and Ferns" has been published by Messrs. Macmillan and Co., Ltd. The first edition was published in 1895, and was reviewed at length in our issue for January 2, 1896 (vol. liii. p 194). Portions of the work have been re-cast entirely, this being especially the case with the eusporangiate ferns. The whole book has been carefully revised and new matter has been introduced, including two special chapters on the geological history of the Archegoniates and the significance of the alternation of generations. Some of the new material is published now for the first time, but much of it is based upon papers written by Prof. Campbell during the last ten years.

OUR ASTRONOMICAL COLUMN.

PERIODICAL COMETS DUE TO RETURN THIS YEAR.—Writing to the *Observatory* (No. 366), Mr. W. T. Lynn directs attention to the fact that two known periodical comets are due to return during the present year—Holmes's comet in the spring, Finlay's in the summer. The former has already been noted in these columns. Finlay's comet was discovered at the Cape on September 26, 1886, and performed its perihelion passage on November 22 of the same year; its period is about 6·6 years, and on its return in 1892 it was first seen by the discoverer himself, and passed perihelion on June 16. On its return in 1899 the comet was unfavourably situated for observation, and so escaped detection.

A note published in No. 1, vol. xiv., of *Popular Astronomy* mentions six other periodical comets as being due this year, viz. Barnard's (1884 II.), E. Swift's (1894 IV.), Denning's (1881 V.), Swift's (1889 VI.), and the two lost comets, Biela's and Brorsen's. Of these, the first and second will be unfavourably placed for observation; the third has not been seen since 1881, but will be more favourably placed this year; the fourth was very faint in 1889, and any small change in the period may have rendered it wholly invisible.

THE ANNULAR NEBULA IN CYGNUS (N.G.C. 6894).—An interesting photographic study of the very faint annular nebula N.G.C. 6894 has recently been made at the Meudon Observatory by M. G. Tikhoff. Using the 39-inch reflector, the observer obtained four photographs, of which he has measured the two best, taken on September 27 and October 27 with exposures 2h. 20m. and 3h. respectively.

These photographs showed the nebula to have the form of an elliptical ring with a condensation in the centre, the space between the nucleus and the outer ring being fairly bright. The extremities of the major axis of the ellipse are sharp, but several faint appendices are clustered around the ends of the minor axis. Measurements of the plate obtained on September 27 showed the length of the major axis to be 44″·8, that of the minor axis 37″·3, but if the appendices be included the length of the latter becomes 50″·8. The nebula really consists of two rings, a broad outer one and a narrow inner ring, but the duplication is interrupted on the north-west by the star discovered by Lord Rosse in 1855. The outer ring has several condensations in it, of which the two brightest are nearly opposite to Lord Rosse's star.

M. Tikhoff recalls the fact that all observers of this nebula have commented on its similarity to the ring nebula in Lyra, and advances the opinion that it is probably in a later stage of development, for whereas the Ring Nebula has only one condensation, this Cygnian nebula has many.

RIGHT ASCENSIONS OF THE EROS COMPARISON STARS.—In Nos. 4059–4060 of the *Astronomische Nachrichten*, Dr. Fritz Cohn, of Königsberg, gives a catalogue containing the definitive positions of the Eros comparison stars contained in the two lists iussed by the international committee. The positions are given for 1900·0, and two supplementary tables give the proper motions necessary for reducing the places of the few stars known to be in motion to the equator of 1901·0.

OBSERVATIONS OF NOVA PERSEI (NO. 2) AND NOVA GEMINORUM.—The results of a series of magnitude observations of Novæ Persei and Geminorum are given in No. 4066 of the *Astronomische Nachrichten* by Dr. K. Graff, of the Hamburg Observatory. The Nova Persei observations extend from March 11, 1902, to August 24, 1905, and show one or two apparent oscillations of the brightness. On the latter date the magnitude of this star was recorded as 10·73.

The record for Nova Geminorum contains the results of six observations made between September 16, 1903, and November 10, 1904, and shows an apparent increase in the brightness between January 20, 1904, and the final observation; the latter was, however, somewhat uncertain, and gave a magnitude of <12·0.

On November 28, 1905, Prof. Max Wolf found that the magnitude of Nova Persei on the Pickering scale was 11·65, but compared photographically with the stars given by Father Hagen the magnitude came out as 10·6.

DOUBLE STAR ORBITS.—Prof. Doberck publishes four possible orbits for τ Ophiuchi and two for γ Centauri in No. 4063 of the *Astronomische Nachrichten*. Of these, he finds, on comparison, that the following agree most closely with observational results:—

τ Ophiuchi	γ Centauri
$\Omega = 76^\circ\ 12'$	$\Omega = 3^\circ\ 21'$
$\lambda = 17\ 45$	$\lambda = 285\ 2$
$\gamma = 66\ 4$	$\gamma = 81\ 47$
$e = 0{\cdot}5338$	$e = 0{\cdot}2958$
$P = 223{\cdot}82y.$	$P = 211{\cdot}93y.$
$T = 1814{\cdot}79$	$T = 1851{\cdot}63$
$a = 1''{\cdot}307$	$a = 1''{\cdot}924$

The value of the hypothetical parallax for τ Ophiuchi is 0″·035, and for γ Centauri 0″·054. In the elements of the latter, the epoch and the longitude of periastron are somewhat uncertain, and for this star the motion is retrograde.